

Newsletter of
the Materials
Physics and
Applications
Division

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Development of unique magnet nets 100-Tesla Team distinguished performance award

Magnet gives Laboratory one-of-a-kind capability

The 100-Tesla Team was recently recognized with a Laboratory Distinguished Performance Award. These Laboratory awards recognize individual employees, small teams, and large project teams who have had a positive impact on Los Alamos National Laboratory's programmatic activities, status in the scientific community or performed outstanding administrative or operation activities that enabled programmatic or scientific achievements.

The 100-Tesla Team established the 100-Tesla Multishot Magnet for user operations at the Laboratory's Pulsed Field Facility, which is part of the National High Magnetic Field Laboratory. The magnet gives Los Alamos a capability that exists nowhere else in the world.

Design and construction of a pulsed magnet of this kind were very challenging tasks, requiring long hours to overcome many real-world engineering issues. The team used new materials in the final design and also found innovative ways to incorporate "normal" materials. Members devised clever ways of decoupling mega-joule capacitor bank system output pulses from the



Members of the 100-Tesla Team include (front row kneeling) Ken Hurtle, Ernie Serna, and Mario Manzo; (middle row) Gretchen Ellis, Chuck Swenson, Dwight Rickel, Keith Kihara, Mike Pacheco, and Alex Lacerda; (back row) James Michel, Darrell Roybal, James Sims, Curtt Ammerman, and Mike Gordon.

1.4 GW generator power outsert.

The 100-tesla magnet enables research under conditions that are expected to provide scientific breakthroughs. Initial scientific experiments have already led to new discoveries in high-temperature semiconductors and new results on heavy-fermion systems. The team has made an exciting new research tool available to the scientific community.

Team members are Dwight

Rickel, Curtt Ammerman, Mike Gordon, Alex Lacerda, Jeffrey Martin, James Michel, Mike Pacheco, Alan Paris, Darrell Roybal, Josef Schillig, Ernie Serna, and Chuck Swenson, MPA-NHFML; Charles Combs, Gretchen Ellis, Michael Hood, Ken Hurtle, Keith Kihara, Mario Manzo, and James Sims AET-1; Christopher Martinez, C-ADI; and Coe Hideyoshi, WT.

LDI expanded to include members from all of EPS directorate

A new class of the Leadership Development Initiative (LDI) is set to be inducted this month and participants now include representatives from all of the Experimental Physical Sciences organization.

This professional development program began in 2005 with six members from the Materials Science and Technology Division. It grew in 2006 to include

**New class to meet
in kick-off event
this month**

members from both the newly restructured MST Division and newly formed Materials Physics and Applications Division. Participants are early- to mid-career EPS employees recognized for high performance who demonstrate high potential to benefit from further development of their leadership skills. As part of the year-long

"LDI" continued on page 4

From David's desk

Materials Physics and Applications: Creating our future

I've now been with MPA Division for a month, and it is good to be back working with many of you. I appreciate the welcome I have been given. One of the things I found attractive about MPA Division is the enviable position it has to create its own future. The talents and interests of our staff, combined with the opportunities that are available in energy programs, in addressing the threat reduction mission, and in the basic science of materials, give us the opportunity to actively pursue a future of our own making. I fully appreciate the uncertainties that we face, and I recognize there is a certain amount of audacity in claiming we will be able to create our own future. Indeed, Niels Bohr said "Prediction is very difficult, especially about the future." So, I won't claim to be able to tell you exactly what will come of our attempts, but I do believe we can and should pursue a common vision of our future as a division. What I hope to do in this article is to give you some insight into my thinking about strategic planning for the division. I also want to provide you with an update on where we stand on a collective statement of MPA Division capabilities.

To set the stage, I want to define what I mean by "capability." There are two key elements to a scientific or technological capability: people and tools. The tools in

MPA's portfolio range from simple diagnostic instruments to major user facilities. Some of the tools are absolutely unique, while others are ubiquitous and would be found in any research organization. Nevertheless, these are all essential to our capabilities. Our personnel bring what I see as the more valuable contribution to our capabilities: intellectual prowess. That is, the tools are important, but it is the ability to understand and interpret the results of experiments and to generate theories and hypotheses that most firmly establishes a scientific capability.

The MPA Division Council has been meeting in executive session to develop a collective statement of our capabilities. This is a critical step in strategic planning—it establishes the starting point for any path we hope to take in creating our future. To date, we have captured the division's scientific and technical capabilities in five succinct statements:

- 1) We produce functional materials and architectures.
- 2) We create knowledge of the fundamental properties of materials.
- 3) We devise new experimental tools and spectroscopic techniques.
- 4) We create extreme conditions to probe materials.
- 5) We translate science to solutions, and problems to scientific challenges.

Each of these capabilities has been described in more detail, and as we develop our strategic plan we will engage with you in a more detailed discussion of what we mean by these capability statements.

There is one final element of capabilities that I want to discuss. Since it has a slightly different character, I wanted to first connect my definition of capability to the National Science Foundation's approach to investing federal research funding. The NSF claims to invest towards four overarching goals: people, tools,



ideas, and organizational excellence. I stated people and tools are essential to scientific and technical capabilities. In my view, ideas are one of the driving factors in the evolution of those scientific capabilities.

Organizational excellence also plays a key role, one I see as related to MPA's sixth capability. We're still debating the best statement of this capability, so here I'll describe it as follows: "MPA is a key interface to the international scientific community, through stewardship of national user facilities, through industrial partnerships, through mentoring postdocs, and through university collaborations."

Our statement of capabilities provides us with a foundation for developing a strategic plan. I've already stated that I see ideas as a key element in the evolution of an organization's scientific and technical capabilities. Future MPA capabilities will be driven by the ideas and discoveries of our technical staff, and this is the most likely point of origin of revolutionary change in capabilities. To make the most of this, we must manage the division to create opportunity for, and take advantage of, innovations. This requires flexibility in any strategy we develop. Future MPA capabilities will also be driven by the missions of the Laboratory and the programmatic funding we can attract. We need a pragmatic approach to program development to ensure financial stability and growth, but we also need to seek out programs that enable us to develop our capabilities—that is, programs that are intellectually challenging and also that enable us to build new facilities and diagnostics. These strategic approaches are essential, but incomplete. To my way of thinking, retaining and attracting talented scientific staff with a diverse set of skills in materials physics and applications is absolutely the most important element of our long-term strategic plan. That is, it is the talents and capabilities of all personnel in MPA Division that will determine, more than any other factor, the future of MPA Division. This will be at the very core of our strategic planning.

—MPA Deputy Division Leader
David Watkins

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material matters

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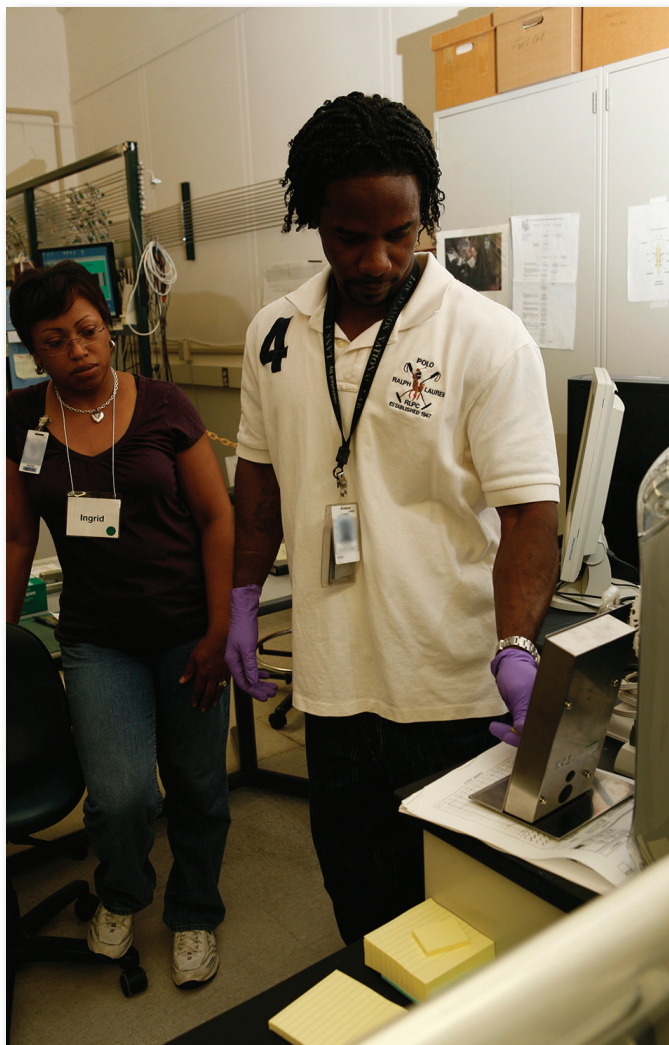
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To read past issues of MPA Material Matters see www.lanl.gov/orgs/mpa/materialmatters.shtml



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First Los Alamos National Laboratory fuel cell workshop a success



MPA-11 recently conducted a two-and-a-half-day workshop on fuel cell testing procedures for 15 representatives from academia, industry, the Department of Energy, and national laboratories. The students were introduced to theory through lectures from MPA-11 experts, followed by supervised hands-on work in the laboratory. The short course spanned fundamental electrochemistry, MEA (membrane electrode assembly) preparation, test stand operation, flow meter calibration, AC impedance measurement and interpretation, cyclic voltammetry, and gas analysis. The participants, most of whom are practicing fuel cell researchers, provided valuable comments on the course, which will be incorporated into future classes.



At left, MPA-11's Tommy Rockward explains flow meter calibration to Ingrid Milton of the DOE Hydrogen, Fuel Cells & Infrastructure Technologies during the Fuel Cell Short Course lab session. Above, MPA-11's Rangachary Mukundan (far right) discusses AC impedance measurements with students.

MPA-10's thermoacoustic-driven natural gas liquefier technology selected as winner in *Wall Street Journal* Technology Innovation Award, energy category

Los Alamos technology—developed by a team led by MPA-10's Greg Swift—was recently named a winner in the *Wall Street Journal* Technology Innovation Awards, energy category.

With a device designed to harness wasted or dormant energy resources, the team developed a method to liquefy natural gas through a thermoacoustic process that cools the gas with sound waves. The process differs from traditional methods because it produces smaller quantities but with much higher reliability and at lower cost. Los Alamos has licensed the technology to Swift LNG Inc., of Houston.

According to a study done by the United States Government Accountability Office, every year about 3.3 trillion cubic feet of natural gas is flared or vented—burned

wastefully or released into the atmosphere—across the globe, enough to meet the natural gas needs of France and Germany for a year. In addition, some 5,000 trillion cubic feet of undeveloped and unused natural gas deposits exist around the world in well fields that are too expensive to develop due to their size or location.

Team members include Swift, Scott Backhaus, David Gardner, all MPA-10; Bill Ward, AET-6; John Gorman and Vince Kotsubo of Swift LNG; and Marc Oettinger of LANL Tech Transfer.

More than 800 applications were submitted to the competition, which recognizes technology that represents a breakthrough from traditional methods, and not just an incremental improvement.

HeadsUP, MPA!



Fire safety at home

October is Fire Safety Month. Visit http://www.homesafetycouncil.org/safety_guide/sg_fire_w001.aspx and take the time to follow these tips and advice to prevent fires in your home.

Portable fire extinguishers

Portable fire extinguishers are stationed throughout our workplaces. To find out more about how and when to use an extinguisher see http://eshtraining.lanl.gov/site_content/fliers/Fire_Ext_IF_010_01-06,R0.pdf.



Badgeholder responsibilities

Do you know the dos and don'ts of wearing your Los Alamos National Laboratory security badge? Where should you wear it? How should it be displayed? What should you do if you lose it?

Answers to these questions and more, including safety issues and resources, can be found at the Security Smart, http://int.lanl.gov/security/documents/security-smart/badgeholder10_07.pdf

Additional flu vaccine to be available soon

Occupational Medicine (OM) has used up its current supply of flu vaccine, but additional vaccine is expected to be delivered shortly to the Laboratory, according to Cory Thrasher of Occupational Medicine. Free flu shots will resume on October 23 at Occupational Medicine (Building 1411) at Technical Area 3.



Any employee with a badge is eligible to receive a flu shot, including subcontract personnel.

All workers will be required to read and sign a consent form before being vaccinated.

Check Occupational Medicine's schedule at http://int.lanl.gov/health/occmed/docs/2007_flu_schedule.pdf for more information.

Commuters to get new shelter

Construction of a new bus shelter at the park-and-ride commuter bus pick-up and drop-off area near Technical Area 3 is scheduled to begin this month.



The work should be completed around October 26, weather permitting, said Mark Harris of Construction Managers (CM-CMGRS).

The area will remain in use for buses and commuters. However, portions of the area will be restricted because of the work.

Harris asks employees to stay out of the marked construction zones and watch for construction traffic in the area.

He noted that there will be welding, cutting, grinding, and hoisting activities. Much of the work will be scheduled to avoid peak hours for Laboratory and other commuters.

For more information, call Harris at 5-4466.

MPA-11's Pivovar co-chairs Gordon Research Conference on fuel cells

Bryan Pivovar, MPA-11, co-chaired with Tomoyuki Tada (Tanaka Kikinzoku Kogyo) the 2007 Gordon Research Conference - Fuel Cells in Smithfield, Rhode Island in July. This ninth Gordon Conference on fuel cells had more than 150 participants and brought together a diverse spectrum of international researchers to address research needs for fuel cell commercialization.

Speakers included representatives from major auto companies, leading universities, national laboratories, a Department of Energy program manager, and a former US undersecretary of energy. The Gordon Conference—Fuel Cells, is often viewed as the top technical fuel cell conference because the “off-the-record” policy employed and informal sessions lead to increased participant interaction.

“LDI”

Continued from page 1

leadership development program, LDI members participate in an in-depth leadership evaluation consisting of a 360-survey and a simulation based assessment program, coaching and mentoring, topical quarterly meetings with Directorate management, and a class project directed at addressing a Directorate challenge.

This year's class includes Reg Rocha, MPA-CINT; Chuck Mielke, MPA-NHMFL; Chris Rose, MPA-STC; Christy Ruggiero, MPA-MC; Andy Duffield, MST-6; Kathryn Berchtold, MST-7; Chris Stanek and Ellen Cerreta, MST-8; Franz Frieber, MST-16; David Oro, P-22; Kathy Prestridge, P-23; Scott Hsu, P-24; Ming Liu, P-25; Ron Nelson, LANSCE-NS; and Frans Trou and Leilani Conradson, LANSCE-LC.

The program begins this month with a welcome by management followed in November by a half-day assessment event.

Heads UP, MPA! reports on environment, safety, and health, security, and facility-related news and information.